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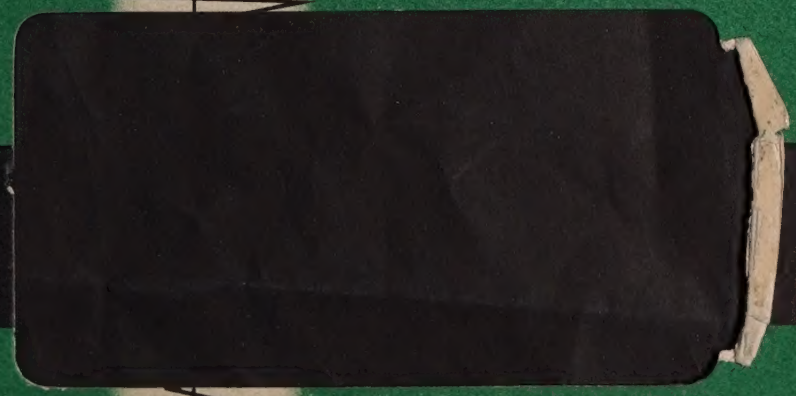

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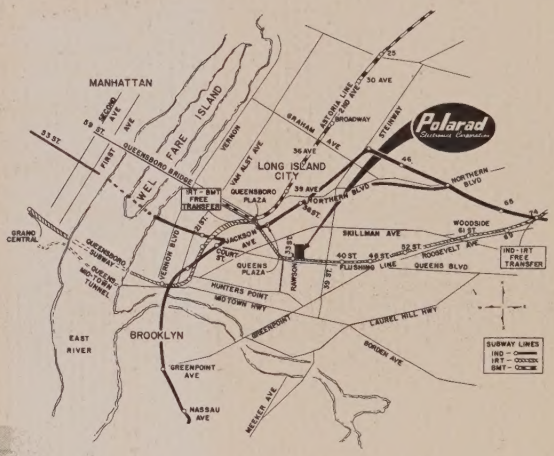

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INSTRUCTION MANUAL

MODEL SD-1

MULTIPULSE SPECTRUM SELECTOR

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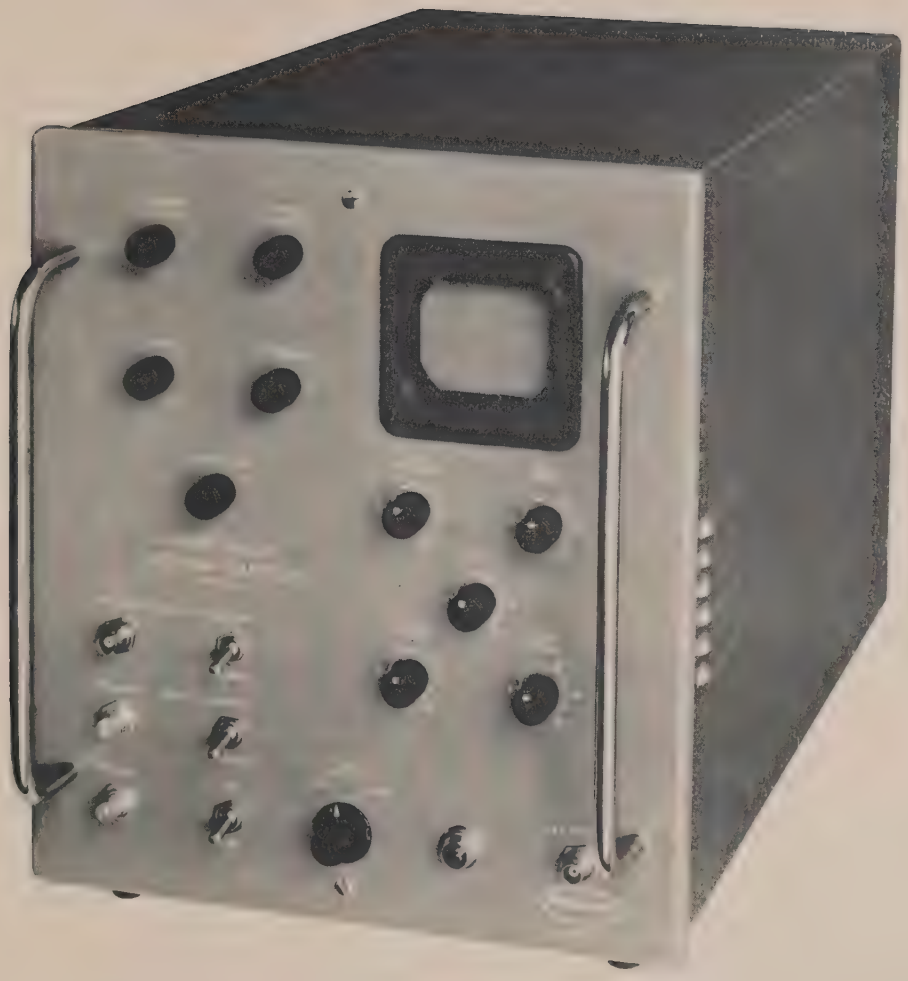


Figure 1. Model SD-1 Multipulse Spectrum Selector.

MODEL SD-1

MULTIPULSE SPECTRUM SELECTOR

SECTION 1

GENERAL DESCRIPTION

1-1. SCOPE OF MANUAL

This instruction manual contains directions for the installation, operation and maintenance of the Polarad Model SD-1 Multipulse Spectrum Selector. In addition to these instructions, there is a listing of the technical characteristics and a brief theory of operation of the equipment. The unit is designed and manufactured by the Polarad Electronics Corporation, Long Island City 1, New York.

1-2. USES OF THE MODEL SD-1 MULTIPULSE SPECTRUM SELECTOR

The Multipulse Spectrum Selector, in conjunction with a spectrum analyzer may be used to separate, select, identify and observe the spectrum of one or more pulses of a pulse train.

1-3. GENERAL

The Model SD-1 Multipulse Spectrum Selector consists of an i-f amplifier, an electronic gate, a 3-inch cathode ray tube monitor with its associated deflection circuits, various gate control circuits and two power supplies. The unit is housed in a dust cover with louvered sides. In operation, the 160 mc output of a spectrum analyzer mixer is fed to the Multipulse Spectrum Selector input; the controls are set so that all pulses of the group may be observed on the selector CRT and the desired pulse or pulses only fed to the spectrum analyzer i-f amplifier for display on its CRT. The selected pulse or pulses are not distorted nor is the spectrum analyzer loaded down. See figure 2. The i-f amplifier is designed for operation at the 160 mc i-f center-frequency of the Polarad Models LSA and TSA Spectrum Analyzers. The electronic gate is gated on at a time coincident with the imposition of an intensifier gate on the CRT monitor. The gates are continuously adjustable to give the desired width (.4 to 10 microseconds) and position (1.0 to 150 microseconds) on the selector CRT display, so that a particular pulse or pulses may be selected and presented on the spectrum analyzer display. All operating controls are on the front panel. A sweep expansion control allows close inspection of a pulse in a closely spaced group of pulses. A group length control permits the manual setting of the sweep time to coincide with the pulse group duration so that all pulses in the group may be displayed on the selector CRT and the desired pulse identified and selected.

1-4. TECHNICAL CHARACTERISTICS

Maximum pulse group time	180 usec.
Minimum pulse group time	.05 usec.
Minimum pulse separation between first and second pulses	.5 usec.
Minimum pulse separation between any two following pulses	.2 usec.
Minimum pulse width	.1 usec.
Repetition rate	10-10,000 pps.
Input impedance	50 ohms.
Output impedance	50 ohms.
Input power	95 to 130 volts, 50 to 60 cps; 5 amps.
Tube complement	1-2Y2; 2-3WP1; 2-5R4; 4-6AH6; 9-6AK5; 1-6AL5; 1-6AN5; 1-6AS6; 2-6AU6;2-6X4; 2-12AT7; 2-12AU7; 1-12AX7; 3-5687; 1-5763; 1-5814; 2-6080; 1-0A2.
Dimensions	12-7/8 in. wide x 14-1/2 in. high x 20 in. deep.
Weight	75 lbs.

SECTION 2

OPERATION

2-1. OPERATING CONTROLS

All operating controls are located on the front panel. Table 1 lists the controls and their functions

TABLE 1. OPERATING CONTROLS AND CONNECTIONS

Controls or Connections	Function
HORIZONTAL POSITION	Shifts the display left or right on the cathode ray tube screen.
VERTICAL POSITION	Shifts the display up or down on the cathode ray tube screen.
FOCUS	Focuses the display on the scope screen.
INTENSITY	Sets the general brightness level of the trace.
ASTIGMATISM	Sets the sharpness of line for the display.
SWEEP EXPANDER	A switch and potentiometer on a single shaft. The switch turns on the sweep expander for an expansion of approximately 7 times. The potentiometer moves the sweep horizontally across the screen.

TABLE 1. OPERATING CONTROLS AND CONNECTIONS (Cont'd)

Controls or Connections	Function
I.F. GAIN	Varies the gain of the i-f amplifier.
GROUP LENGTH	Used to set the sweep time to cover pulse group duration (15 to 180 usec)
PULSE SELECTOR	A triple-pole double-throw switch which selects the first pulse of the group being observed in FIRST position; and permits selection of any other pulse of the group in OTHERS position.
GATE POSITION	In conjunction with the GATE WIDTH control, selects the pulse to be passed to the spectrum analyzer, in OTHERS position of the PULSE SELECTOR; and simultaneously varies the horizontal position of the intensity gate displayed on the selector CRT, so that the desired pulse may be chosen.
GATE WIDTH	Sets the time during which the crystal diode gate is open to pass the desired signal pulse to the spectrum analyzer. The duration of the intensity gate displayed on the selector CRT is set simultaneously so that the intensity gate and pulse widths may be compared on the selector display; and so that the desired open time for the crystal diode gate may be chosen.
R.F. INPUT	A type BNC connector for application of the r-f signal from the spectrum analyzer mixer output.
R.F. OUTPUT	A type BNC connector for application of the selected pulse to the spectrum analyzer.
GATE	A type BNC connector for application of an external gating voltage.
INTERNAL-EXTERNAL	A double-pole single-throw switch which connects the internal gating voltages in INTERNAL position and disconnects the internal gating to permit an external gating voltage in EXTERNAL position.
SYNC	A type BNC connector for application of an external SYNC voltage.
INTERNAL-EXTERNAL	A double-pole single-throw switch which connects the internal SYNC voltage in INTERNAL position and disconnects the internal SYNC to permit an external SYNC voltage in external position.
ON-OFF	A double-pole single-throw switch which connects the 95-130 volts, 50-60 cps supply voltage to the power supplies and the fan.

2-2. OPERATING PROCEDURE

a. Setting up the Equipment.

The Multipulse Spectrum Selector Model SD-1 is designed to operate in conjunction with spectrum analyzers having an i-f frequency of 160 mc*, such as the Polarad Models LSA and TSA. To set up the equipment proceed as follows:

*Units are available for operation at other frequencies.

(1) Disconnect the spectrum analyzer mixer output cable and apply the output to the selector front panel BNC connector marked RF INPUT.

(2) Connect the selector output from front panel BNC connector, RF OUTPUT to the input of the spectrum analyzer i-f amplifier.

(3) Set the controls as directed below:

SYNC switch GATE switch	to INTERNAL.
HORIZONTAL POSITION VERTICAL POSITION GATE WIDTH	to center of their range.
SWEEP EXPANDER	to extreme counterclockwise positions.
GROUP LENGTH I.F. GAIN INTENSITY	to extreme clockwise positions.
PULSE SELECTOR	to first position.

(4) Apply the signal to the spectrum analyzer.

(5) Connect a-c power to the spectrum analyzer and to the spectrum selector.

(6) Turn the power on for the spectrum analyzer and spectrum selector. Allow sufficient time for the spectrum analyzer to stabilize.

(7) Vary the HORIZONTAL POSITION, VERTICAL POSITION, FOCUS, INTENSITY, ASTIGMATISM and I.F. GAIN controls to produce and center the pulse group on the selector display. This procedure is identical to the setup of any oscilloscope.

(8) Adjust the GROUP LENGTH control so that all pulses of the group are visible on the selector display (figure 2).

NOTE

Narrow pulses may not be clearly visible. Check by turning SWEEP EXPANDER switch on.

b. To View the First Pulse of a Group.

After setting up the equipment as outlined in step a. proceed as follows:

(1) Set the PULSE SELECTOR switch to FIRST position.

(2) To expand the width of the first pulse adjust the SWEEP EXPANDER.

c. To View Any Pulse Other Than the First.

After setting up the equipment, as outlined in step a. proceed as follows:

(1) Set the PULSE SELECTOR switch to OTHERS position.

(2) Set the GATE POSITION control completely counterclockwise.

(3) Adjust the INTENSITY control to diminish the brightness until only the gate is intensified and the remainder of the spectrum displayed is just visible.

(4) Adjust the GATE POSITION control until the leading edge of the gate is superimposed upon the leading edge of the desired pulse.

(5) Adjust the GATE WIDTH control until the desired pulse is covered by the intensity gate. Only the intensified portion of the spectrum displayed is passed on to the spectrum analyzer. See figure 3.

(6) To expand the width of the pulse or pulses, adjust the SWEEP EXPANDER.

d. External Gating.

To utilize an external gating voltage to control the crystal diode gate, set up the equipment as outlined in step a. and proceed as follows:

(1) Apply the external gating signal to the GATE type BNC connector on the front panel. The time relationship between the r-f signal and the external gating voltage must be known so that the desired pulse may be selected.

(2) Set the GATE INTERNAL-EXTERNAL switch to EXTERNAL.

Figure 2. Pulse Display on Spectrum Selector vs Spectrum Analyzer Display

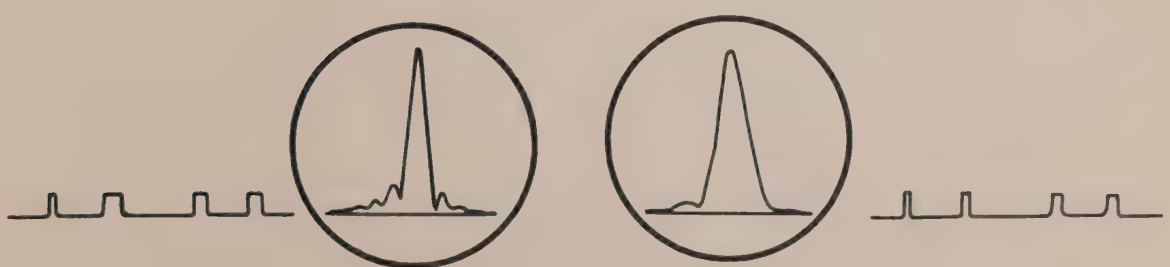


Figure 3. Spectrum Selector Display with Other than First Pulse Isolated by Intensity Gate and Resultant Spectrum Analyzer Display

SECTION 3

PRINCIPLES OF OPERATION

3-1. GENERAL

The principles of operation of the Polarad Model SD-1 Multipulse Spectrum Selector may be understood from the block diagram of figure 4. The 160 mc signal output of a spectrum analyzer mixer is fed to the input of the Model SD-1. The signal is amplified and fed to a crystal diode gate which selects the desired pulse or pulses passed to the spectrum analyzer for display; to the gate control circuits; and to the spectrum selector CRT which displays all pulses in the train. A portion of the spectrum selector display is intensified to indicate which pulse or pulses are being passed to the spectrum analyzer.

3-2. SIGNAL AMPLIFIERS

The 160 mc pulse input is fed to the i-f amplifiers which consists of nine 6AK5 triodes (V1 to V9). A portion of the output of the first three stages is inductively coupled by transformer T1 to the crystal modulator CM-1. The output of the last i-f stage V9, is detected by V10 (6AL5) and passed through cathode follower V11 which provides a low impedance input to video amplifier V12 (6AH6), V12 and V13 (6AN5) comprise the video amplifier section. The output of V13 is fed to cathode followers V36A and V14A. The pulsed signal OUTPUT of V36A is applied to a vertical plate of the cathode ray tube V25 (3WP1). The output of V14A is applied to trigger generator V15.

3-3. CRYSTAL MODULATOR CM-1.

Crystal Modulator CM-1 is comprised essentially, of two crystal diodes in series, a simple output filter and a means of applying bias and gating voltages. The modulator serves as a switch which eliminates undesired pulses and passes the desired pulse or pulses to the spectrum analyzer. The amplified pulse train is coupled from the i-f amplifiers by transformer T1 and applied to the input of the crystal modulator (diode switch).

a. In FIRST position of PULSE SELECTOR switch S2, a bias voltage of approximately minus 6 volts is applied through switch S2. The signal is attenuated 15 db and the diode switch is effectively closed. A positive pulse, derived from the leading edge of the first pulse is applied by the Reject Gate Generator V22, through Cathode Follower V23 to the modulator which then attenuates the pulse train more than 50 db. Thus all pulses after the first are effectively blocked and the first pulse of the group train only, is passed to the spectrum analyzer for display.

b. In OTHERS position of PULSE SELECTOR switch S2, no d-c bias is applied to the diode switch, the r-f pulse train is attenuated more than 50 db and is effectively blocked from passage to the spectrum analyzer. A negative pulse, coincident in time with the desired pulse, is applied by the Accept Gate generator

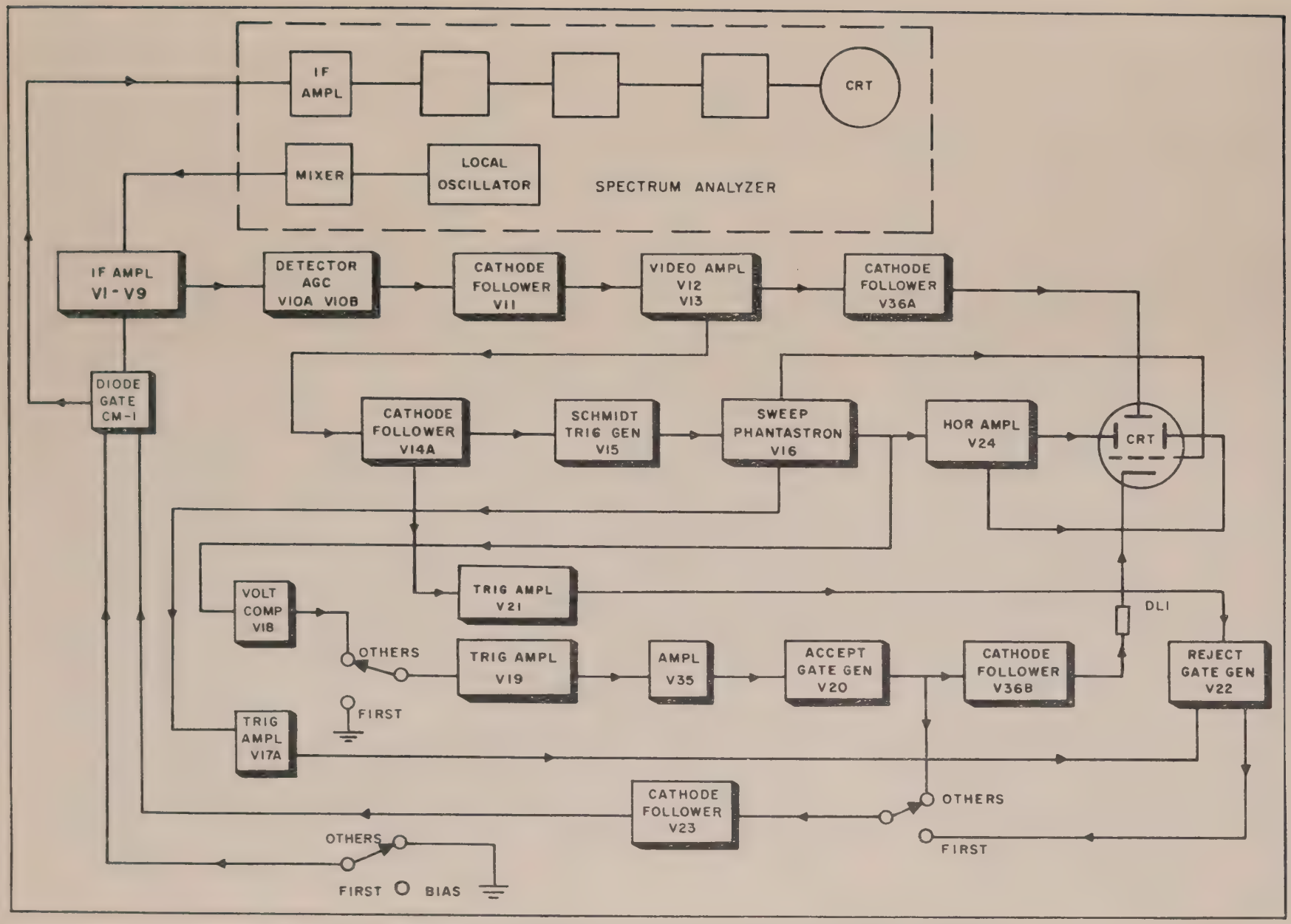


Figure 4. Multipulse Spectrum Selector, Functional Block Diagram

V20 through Cathode Follower V23 to the diode switch. The attenuation offered by the diode switch to the desired pulse is then reduced to 12 db and the desired pulse is passed to the spectrum analyzer.

3-4. SWEEP CIRCUITS.

The pulsed signal output of V 14A is fed to Schmidt trigger Generator V15 (5687) which uses a Schmidt discriminator circuit to provide constant amplitude triggering pulses for the Sweep Phantastron V16 (6AS6). The Sweep Phantastron is triggered by the first pulse of the group train provided by V15, and is unaffected by other pulses of the group for the duration of its cycle. GROUP LENGTH potentiometer R136, a front panel control, determines the V16 RC time constant and thus the duration (15-150 microseconds) of the cycle, and the duration of the sawtooth and pulse outputs taken from the phantastron. A portion of the sawtooth output is fed to Sweep Expander V24 (12AT7), the CRT horizontal deflection amplifier. The duration of the sawtooth controls the number of pulses displayed. In operation, the GROUP LENGTH control is set to permit the display of one pulse group.

3-5. GATE CONTROL CIRCUITS

a. First Pulse. The pulse output of Sweep Phantastron V16 is differentiated by C137 and R145 and the resultant pulses fed to V17A (1/2-12AU7). The output of V17A is fed, in the FIRST position of PULSE SELECTOR switch S2, to Reject Gate Generator V22. Part of the pulse output of V14A is differentiated, the lagging edge trigger (''trailing edge trigger'') is amplified by Trigger Amplifier V21 (6AH6) and used to trigger Reject Gate Generator V22 (12AU7). V22 uses a bi-stable multivibrator circuit to provide a positive pulse which is applied to the diode switch through V23 to effectively open the switch. In its initial condition, the first section of V22 (pins 1, 2, 3) draws current while the second section is cut-off and the diode switch is closed. The switch remains closed for the duration of the Reject Gate output pulse. The diode switch is opened by the ''trailing edge'' pulse output of V17A which ''cuts off'' the first section of V22 and resets the multivibrator. The resultant sharp increase of voltage at the plate, pin 1, provides the positive pulse gating voltage which closes the modulator gate. The diode switch remains open for the remainder of the pulse group; and is closed at the end of that period by elimination of the positive pulse which occurs when an ''end-of-group'' trigger ''flips'' the multivibrator. The ''end-of-group'' trigger is obtained from the lagging edge of the Sweep Phantastron pulse through V17A, and is fed to the V22 second section control grid pin 7. Figure 5 illustrates the time relationships between the r-f signal pulse train, the sawtooth, the triggers, the Model SD-1 Spectrum Selector display and the spectrum analyzer display for the first pulse.

b. Other Than First Pulse. A portion of the sawtooth output taken from the control grid of V16 is used to trigger Voltage Comparator Delay Generator V18 (12AX7). V18 uses a Schmidt discriminator circuit to provide constant amplitude delayed trigger pulses which are fed to V19 in OTHERS position of PULSE SELECTOR switch S2. The width of the pulses is controlled by GATE POS control R153, a front panel control which sets the delay (1.0 to 180 microseconds) for the leading edge of the V18 pulse, with respect to the end of the sawtooth. The leading edge is applied to V19, the output of which is used to trigger Accept Gate Generator V20 as described in paragraph 4-5 a. The negative output pulse of the Accept

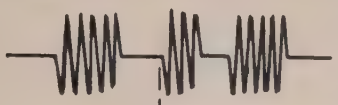
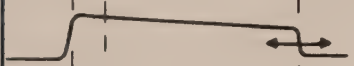
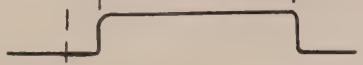
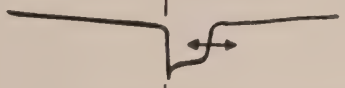
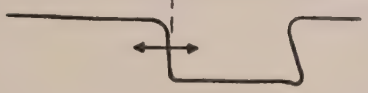
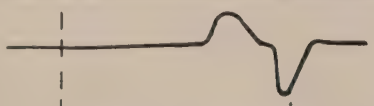
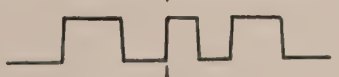
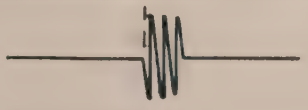
FIRST PULSE	"OTHERS" PULSE	DESCRIPTION
		R-f input to spectrum analyzer and to spctrum selector.
		R-f signal pulse group envelope.
		Phantastron sweep output.
		Input to reject gate generator (trailing edge trigger.)
		Input to accept gate generator.
		Phantastron pulse output.
		Reject gate generator output (gating signal.)
		Accept gate output.
		Voltage comparator output.
		"End of group" trigger.
		Spectrum selector display.
		R-f input to spectrum analyzer I-F.

Figure 5. Pulse Time Relationships

Gate Generator is used to intensify a portion of the selector display and to close the normally open (OTHERS position) diode switch. The setting of the GATE WIDTH control simultaneously determines the intensity gate width and the time during which the diode switch is closed. The setting of the GATE POS control simultaneously determines which pulse of the pulse train is passed by the diode gate, Modulator CM-1, and the relative position of the intensity gate displayed on the selector CRT. See figure 3. Figure 5 illustrates the time relationships between the r-f signal pulses, the sawtooth, the triggers, the Model SD-1 Spectrum Selector display and the spectrum analyzer display in OTHERS position.

SECTION 4

MAINTENANCE

4-1. GENERAL

While extraordinary care has been taken in the manufacture of the Polarad Model SD-1 Multipulse Spectrum Selector and each unit is laboratory tested under strict engineering supervision, it is possible that in the course of use the unit may require checking and servicing. The discussion of principles of operation (Section 3), tables 2 and 3 (this section), the waveforms of figures 5 and 7, and schematic diagrams (figures 6 and 8) should prove helpful in locating a defect.

4-2. ACCESS TO THE EQUIPMENT

Access to the equipment may be obtained by removing the dust cover. Turn the two screws, on the rear of the dust cover, one half turn each and pull the selector unit out of the dust cover.

4-3. PERFORMANCE DATA

The performance data in table 2 depends upon the setting of the I.F. GAIN control. Set the control to maximum clockwise position.

TABLE 2. PERFORMANCE DATA

Circuit Characteristic	Input Signal	Placement of Meter or Oscilloscope	Normal Deflection or Reading
Gain of i-f amplifier section V1-V3.	160 mc unmodulated, 200 microvolts amplitude applied to the R.F. INPUT.	Remove plug P3 and connect meter from J3 to chassis ground.	800 microvolts.
Over-all gain of i-f amplifier V1-V9.	160 mc unmodulated, 200 microvolts amplitude applied to the R.F. INPUT.	Meter from Test Point on i-f chassis to chassis ground.	200 millivolts.

TABLE 2. PERFORMANCE DATA (Cont'd)

Circuit Characteristic	Input Signal	Placement of Meter or Oscilloscope	Normal Deflection or Reading
Gain of Video Amplifiers V12-V13.	.5 volt pulse, as measured on calibrated scope, applied to the video input P12.	Oscilloscope at pin 5 of V13.	50 v on oscilloscope (gain of 10).

4-4. TROUBLE SHOOTING

The conditions outlined in table 3 assume that the spectrum analyzer used is in operating order, and that the equipment has been properly connected, as outlined in paragraph 2-2 steps a (1) and (2).

TABLE 3. TROUBLE SHOOTING

Symptom	Probable Cause	Remedy
No Signal on spectrum selector or analyzer in either FIRST or OTHER positions of PULSE SELECTOR switch.	Defective V1, V2 or V3.	Replace defective tube.
No signal on spectrum analyzer CRT. Normal display on selector CRT.		
a) Either position of PULSE SELECTOR switch.	T1 improperly tuned. Xtal modulator defective.	Retune T1 to 160 mc. Check crystal diodes and replace as required. Normal resistance 300 ohms forward, 50,000 ohms back. CAUTION Use high range scale (X100). Use of low range scales may burn out the crystals.
b) In FIRST position only. OTHERS position normal.	No bias applied to Xtal Modulator CM-1. C166 shorted.	Replace C166.

TABLE 3. TROUBLE SHOOTING (Cont'd)

Symptom	Probable Cause	Remedy
c) In OTHERS position only. FIRST position normal.	V23 defective.	Replace V23.
No gating of analyzer display pulse group in FIRST position. (Complete spectrum displayed on analyzer CRT). No display on analyzer CRT in OTHERS position.		
a) No display on SELECTOR CRT (spot only).	Inoperative tube V4 to V13. Weak tube V1, V2 or V3.	Replace defective tube.
b) Single vertical line on selector CRT.	V14A, V15, V16 or V24 defective.	Replace defective tube.
c) Pulse group but no intensity gate on selector CRT.	Defective tube V17A, V19, V35, V20 or V36B.	Replace defective tube. Note: Check V19 by measuring plate voltage (pin 5). Normal reading should be a minimum of 20 volts less than B+.
Analyzer display gated in OTHERS position. Selector display shows complete group but no intensity gate.	Defective V36B or shorted Delay Line DL1.	Replace V36 or DL1, as required. Check resistance of DL1 to ground. Normal value is approximately 1,300 ohms.
No display on spectrum analyzer or selector CRT in either position.	V1, V2 or V3 defective.	Replace defective tube.
Spectrum analyzer displays a gated signal. No display on selector CRT.	Equipment not properly setup. No CRT high voltage, V26 defective. CRT V25 defective.	Refer to paragraph 2-2, step a. Replace V26. Replace V25.
Single, vertical line on selector CRT. Spectrum analyzer is gated.	V24 defective.	Replace V24.
Single horizontal line on selector CRT. Spectrum analyzer is gated.	V36A defective.	Replace V36A.

4-5. SETTING THE ADJUSTMENTS

All adjustments, except the i-f adjustments, are located at the rear of the chassis. Remove the dust cover to obtain access to the i-f chassis. Loosen the shaft lock before resetting an adjustment. Tighten the shaft lock after resetting.

CAUTION

All adjustments are factory set. Do not readjust unless required for proper operation of the unit.

4-6. SETTING THE DELAY BIAS ADJUSTMENT.

a. The Delay Bias Adj. Potentiometer R194 sets the AGC delay bias for the i-f stages.

b. To set the adjustment proceed as follows:

(1) Insert the positive probe of a d-c meter into the TEST POINT jack on the i-f subchassis, located at the upper rear of the side of the main chassis. Connect the probe to chassis ground.

(2) Turn the I.F. GAIN control maximum clockwise.

(3) Turn the spectrum selector power switch to ON and allow a warm-up period.

(4) Note the d-c meter reading with no signal applied (static voltage).

(5) Feed an unmodulated 220 microvolt, 160 mc signal to the R.F. INPUT.

(6) Vary potentiometer R194 until the d-c meter reads minimum, but not less than .3 volt above the static voltage reading of step (4).

4-7. SETTING THE SWEEP EXPAND ADJUSTMENT

a. Sweep Exp. Adj. potentiometer R199 is used to set the start of the selector CRT sweep at the same point with and without sweep expansion.

b. To set the adjustment proceed as follows:

(1) Apply a 160 mc pulsed r-f signal to the R.F. INPUT.

(2) Turn the spectrum selector power switch to ON and allow sufficient time for the unit to stabilize.

(3) Set up the equipment as directed in subparagraph 2-2 a steps (3), (7) and (8).

(4) Turn the SWEEP EXPANDER switch on and off. The start of the sweep at the left hand side of the CRT should be at the same point in both positions of the switch.

(5) If adjustment is required, vary Sweep Exp. Adj. potentiometer R199, until the sweep starts at the same point in both positions of the SWEEP EXPANDER switch.

4-8. SETTING THE MAXIMUM DELAY ADJUSTMENT

a. Delay Max. Adj. R154 sets the extreme right hand limit of the intensifier gate position.

b. To set the adjustment proceed as follows:

(1) Apply a 160 mc pulsed r-f signal to the R.F. INPUT.

(2) Turn the spectrum selector power switch to ON and allow sufficient time for the unit to stabilize.

(3) Set up the equipment as directed in steps (3), (7) and (8) of subparagraph 2-2 a and steps (1), (2) and (3) of subparagraph c. of 2-2.

(4) Adjust the HORIZONTAL POSITION and VERTICAL POSITION controls so that the sweep is centered vertically and starts at the left hand edge of the CRT screen.

(5) Set the GATE POSITION control to its extreme clockwise position.

(6) Adjust R154 so that the intensity gate just appears at the extreme right hand side.

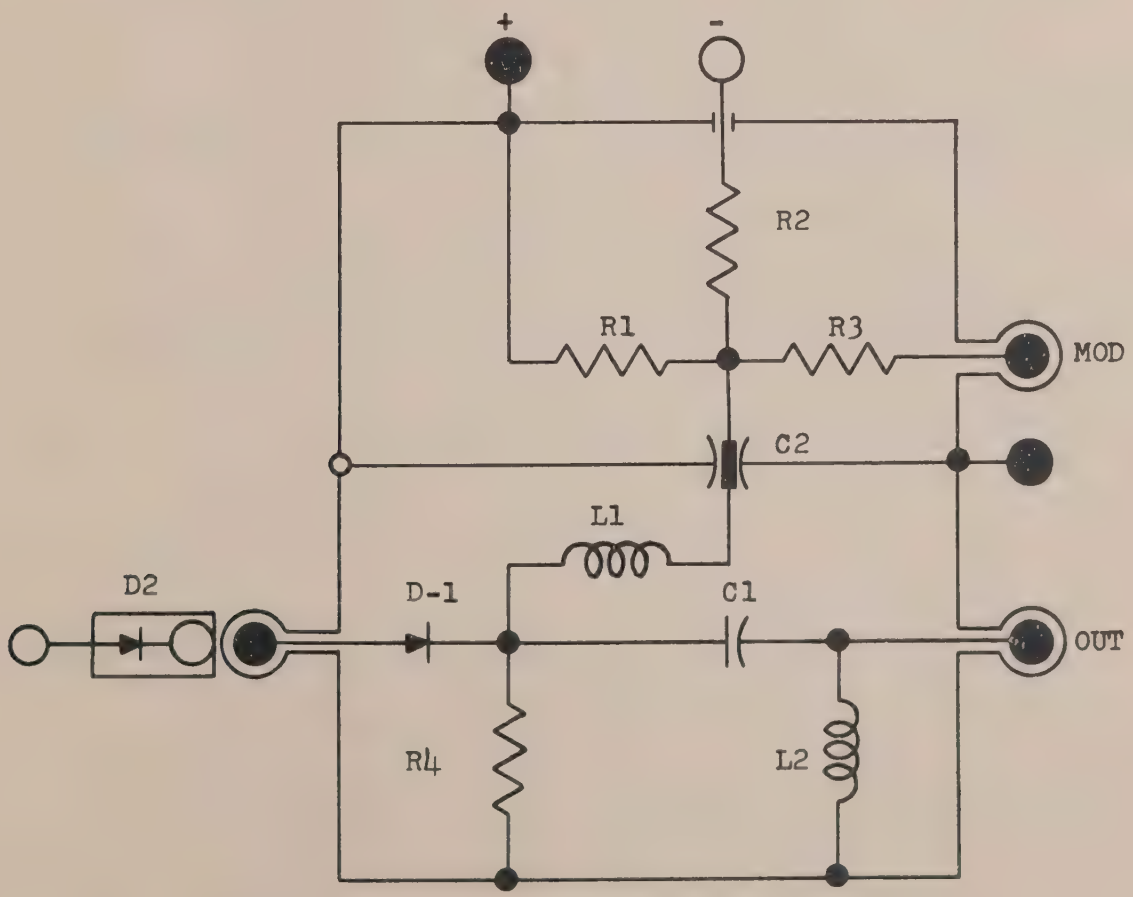


Figure 6. Modulator CM-1, Schematic Diagram

4-9. SETTING THE +300 VOLT ADJUSTMENT.

To set the +300 Volt Adj. potentiometer R104 measure the voltage from pin 6 of V30B to chassis ground and set the adjustment to give a meter reading of +300 volts.

4-10. SETTING THE +125 VOLT ADJUSTMENT.

To set the +125 Volt Adj. potentiometer R108, measure the voltage from pin 3 of V30A to chassis ground and set the adjustment to give a meter reading of +125 volts.

4-11. I-F ALIGNMENT PROCEDURE.

a. The i-f chassis is located at the upper rear of the side of the main chassis. The i-f adjustments may be reached from either the rear or the side. A signal generator within the frequency range 149 mc to 172 mc is required.

b. To align the i-f circuits proceed as follows:

(1) Set the Delay Bias Adj. R194 to maximum voltage across the potentiometer.

(2) Set the front panel I.F. GAIN control completely counterclockwise and then one-quarter turn clockwise.

(3) Turn the power switch ON and allow time for the unit to stabilize.

(4) Connect a VTVM from jack J12 on the i-f chassis to ground. Note the meter reading (static voltage).

(5) Connect the output of the signal generator to the R.F. INPUT.

(6) Set the controls on the signal generator to produce a c-w signal of 160 mc. Control the amplitude throughout this alignment to maintain an output on the VTVM above the static voltage reading and below 0.5 volts.

(7) Tune L21, L18 and T1, in that order, to give maximum output reading on the VTVM.

(8) Set the signal generator frequency to 150.5 mc and tune L20 and L17 for maximum output.

(9) Set the signal generator frequency to 170 mc and tune L19 and L16 for maximum output.

(10) Set the signal generator frequency to 149 mc and tune L14 for maximum output.

(11) Set the signal generator frequency to 172 mc and tune L13 for maximum output.

(12) Refer to paragraph 5-6 and reset the Delay Bias Adj. R194.

4-12. FIRST AMPLITUDE ADJUST.

(1) Feed two pulses of approximately 2 usec in width to Spectrum Selector and monitor them on the Spectrum Analyzer.

(2) Switch to OTHERS position and view second pulse on Analyzer. Adjust R.F. input level for 10 boxes.

(3) Switch to FIRST position and adjust R-155 (1st Amplitude Adj.) for 10 boxes.

NOTE

To clean air filter

1. Immerse in oil solvent
2. Dry
3. Dip in light machine oil
4. Drain & replace

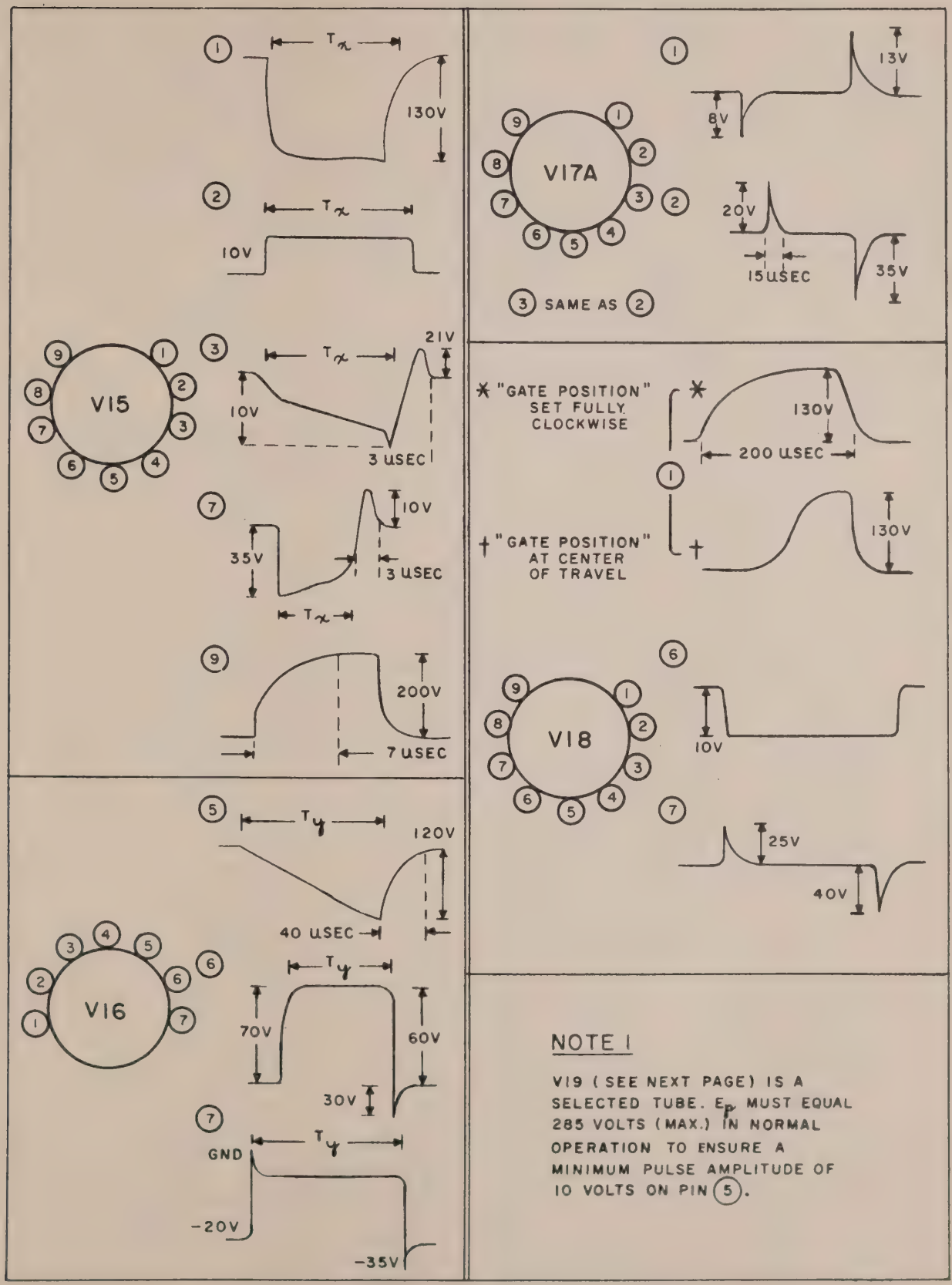


Figure 7. Waveforms (Sheet 1 of 3 sheets)

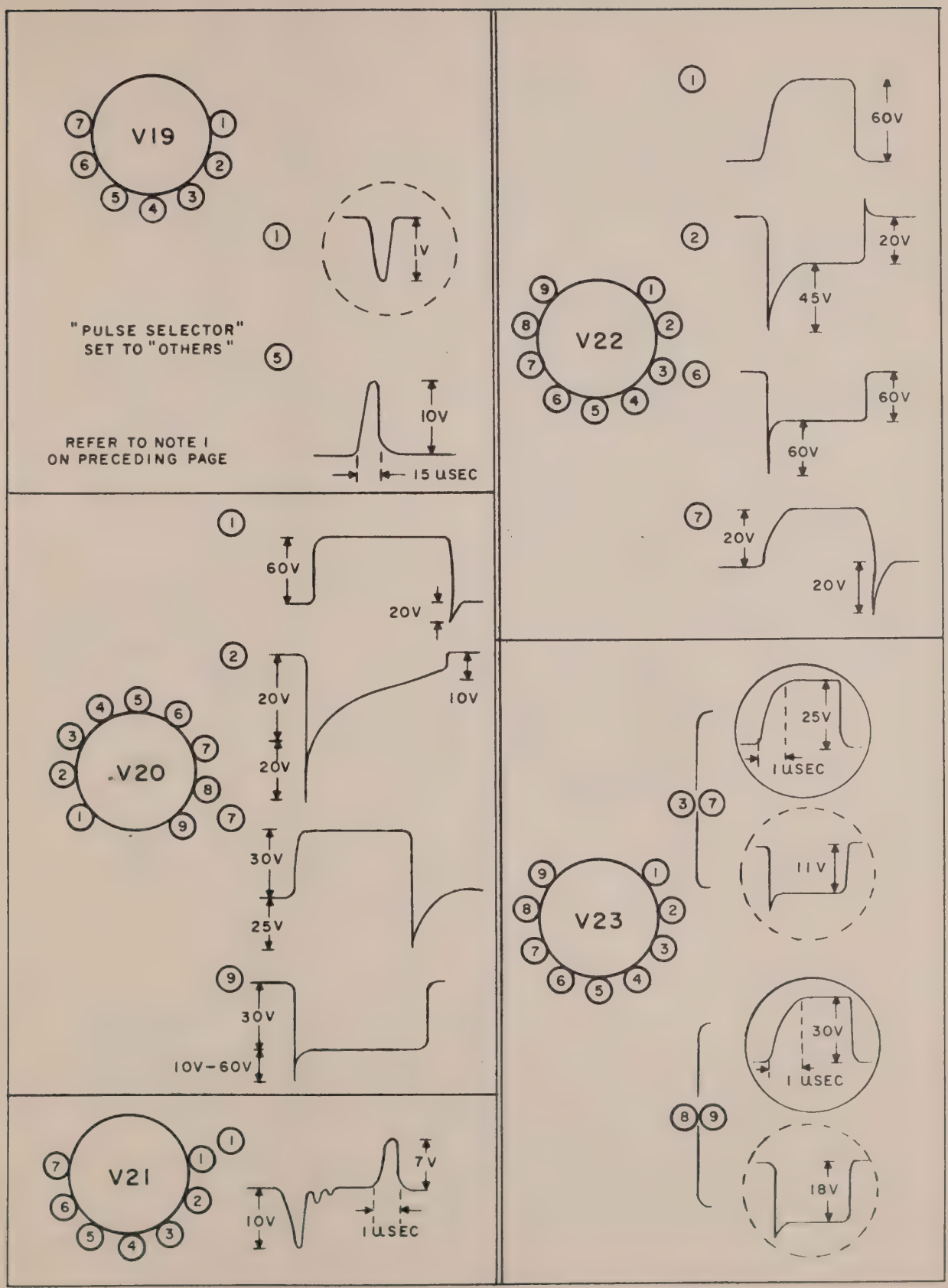


Figure 7. (Waveforms (Sheet 2 of 3 sheets)

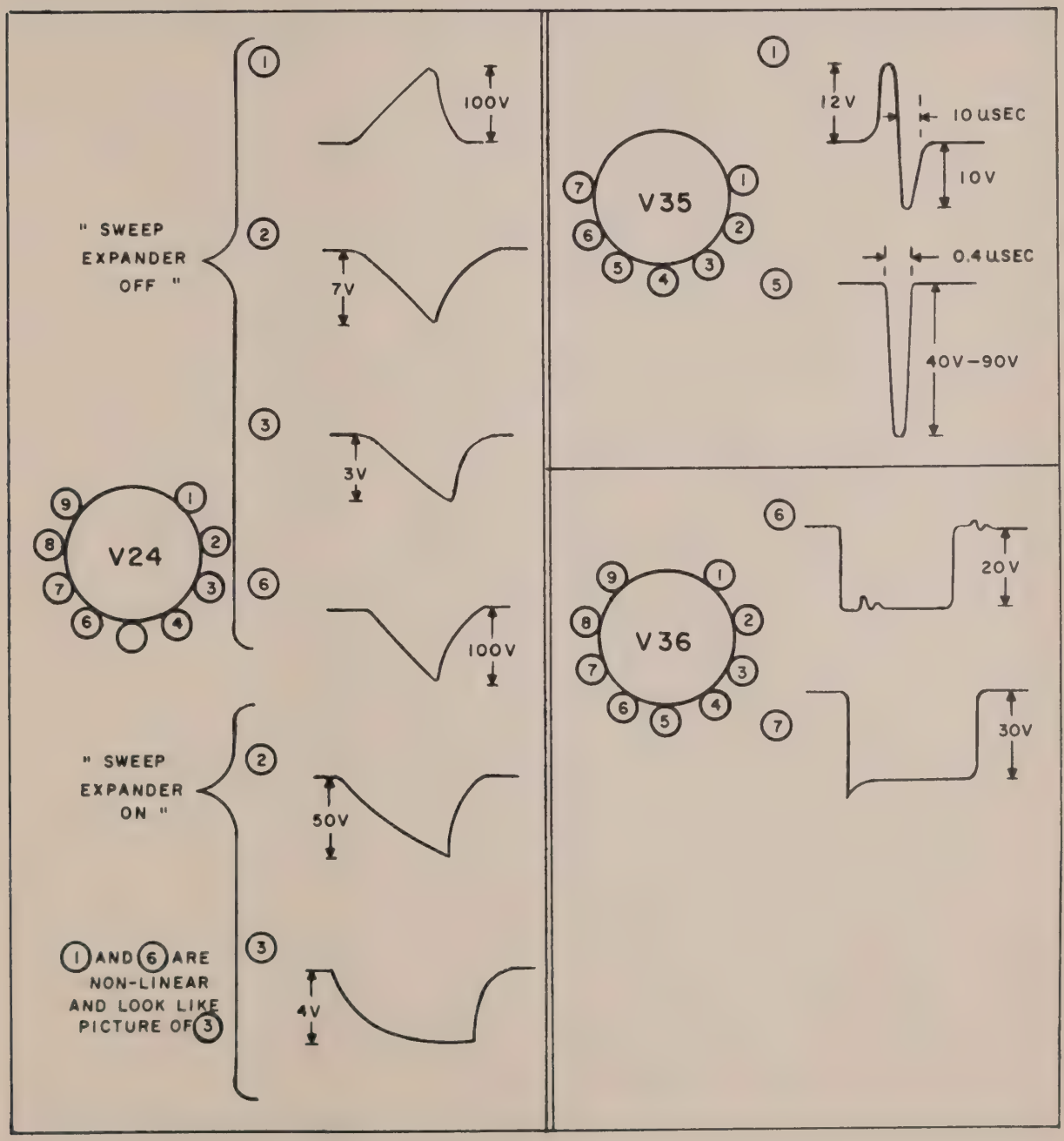


Figure 7. Waveforms (Sheet 3 of 3 sheets)

D-E24321B

2 STAGE VIDEO AMPLIFIER

CATHODE FOLLOWER

SCHMIDT TRIGGER GEN.

CATHODE FOLLOWER

SWEEP PHANTASTRON

TRIGGER AMPLIFIER

VOLTAGE COMPARATOR DELAY GEN.

TRIGGER AMPLIFIER

ACCEPT GATE GEN.

TRIGGER AMPLIFIER

PULSE SELECTOR

SER REG V30 6080

SER REG V37 6080

SWEEP EXPANDER

C.R.T.

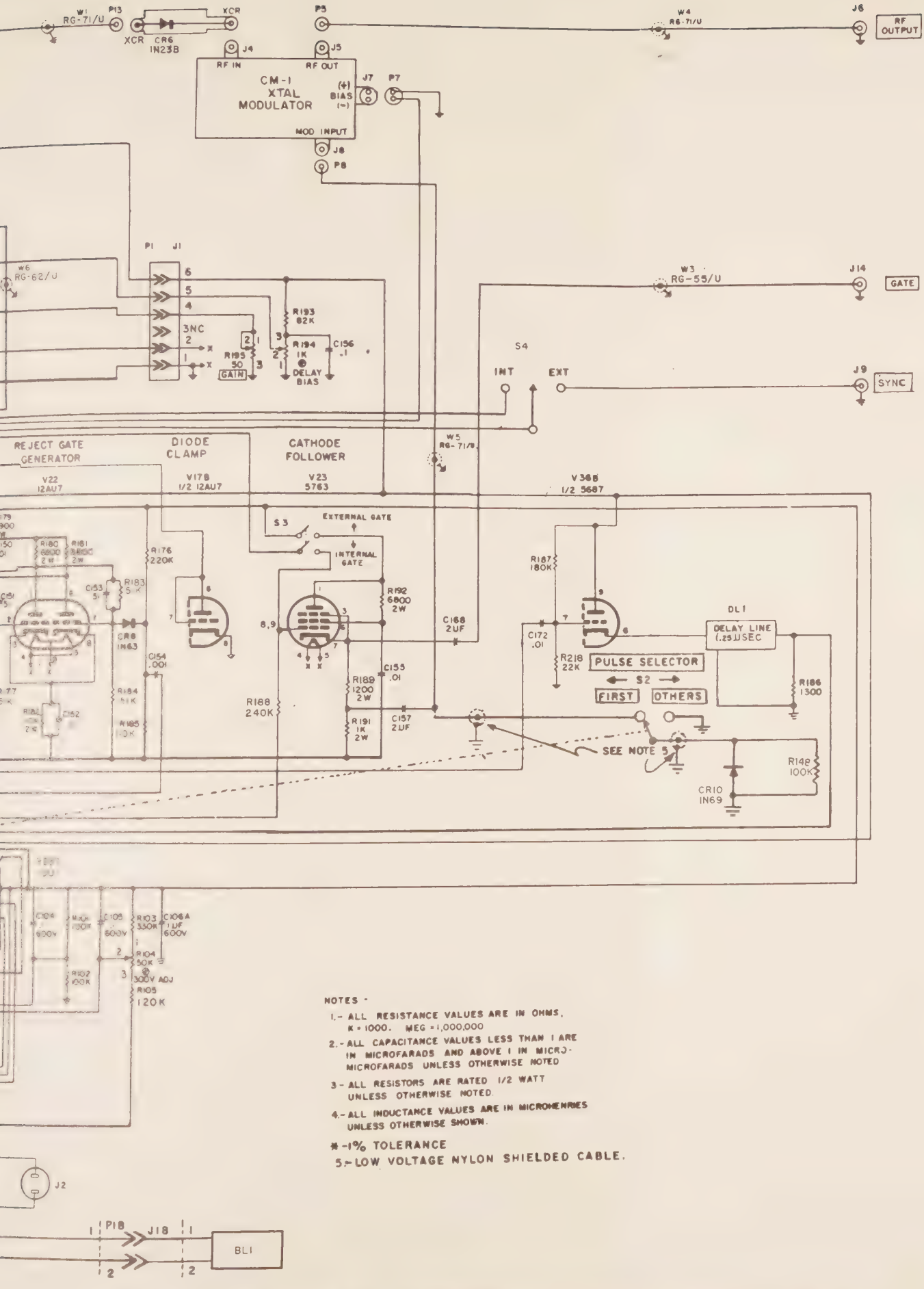
H.V. RECTIFIER

RECTIFIER

VOLTAGE CONTROL

VOLTAGE REGULATOR

Revised 7/1/58 serial nos. 157 and up



NOTES -

1.- ALL RESISTANCE VALUES ARE IN OHMS. K = 1000. MEG = 1,000,000

2.- ALL CAPACITANCE VALUES LESS THAN 1 ARE IN MICROFARADS AND ABOVE 1 IN MICRO-MICROFARADS UNLESS OTHERWISE NOTED

3- ALL RESISTORS ARE RATED 1/2 WATT UNLESS OTHERWISE NOTED.

4.- ALL INDUCTANCE VALUES ARE IN MICROHENRIES UNLESS OTHERWISE SHOWN.

* -1% TOLERANCE

5- LOW VOLTAGE NYLON SHIELDED CABLE.

Figure 8. **Model SD-1 Multipulse Spectrum Selector, Schematic Diagram**

SECTION 5

SPARE PARTS LIST

5-1. SPARE PARTS

The parts included below are non-standard parts utilized in this unit and may be purchased from the Polarad Electronics Corporation.

Item No.	Reference Symbol	Description	Polarad Part No.
1	L1	Coil, 5 uhy	AP24067
2	L2	Coil, 5 uhy	AP24067
3	L3	Coil, 5 uhy	AP24067
4	L4	Coil, 5 uhy	AP24067
5	L5	Coil, 5 uhy	AP24067
6	L6	Coil, 5 uhy	AP24067
7	L7	Coil, 5 uhy	AP24067
8	L8	Coil, 5 uhy	AP24067
9	L9	Coil, 5 uhy	AP24067
10	L11	Coil, 5 uhy	AP24067
11	L12	Coil, .15 uhy	AP24068
12	L13	Coil, 169 to 172 mc	AP24069
13	L14	Coil, 149 to 151 mc	AP24070
14	L16	Coil, 169 to 172 mc	AP24069
15	L17	Coil, 149 to 151 mc	AP24070
16	L18	Coil, 160 mc	AP24071
17	L19	Coil, 169 to 172 mc	AP24069
18	L20	Coil, 149 to 151 mc	AP24070
19	L21	Coil, 160 mc	AP24072
20	L22	Coil, 65 uhy	AP24073
21	L23	Coil, 5 uhy	AP24067
22	L24	Coil, 5 uhy	AP24067
23	L25	Coil, 5 uhy	AP24067
24	L26	Coil, 5 uhy	AP24067
25	L27	Coil, 5 uhy	AP24067
26	L28	Coil, 5 uhy	AP24067
27	L29	Coil, 5 uhy	AP24067
28	L30	Coil, 5 uhy	AP24067
29	L31	Coil, 5 uhy	AP24067
30	L32	Coil, 5 uhy	AP24067
31	L33	Coil, 10 uhy	AP24074
32	L34	Coil, .8 uhy	AP24075
33	L35	Coil, .8 uhy	AP24075
34	L36	Coil, .8 uhy	AP24075
35	L37	Coil, .8 uhy	AP24075
36	L38	Coil, .8 uhy	AP24075
37	L39	Coil, 2 uhy	AP24076
38	L40	Coil, 2 uhy	AP24076
39	L41	Coil, 2 uhy	AP24076

Item No.	Reference Symbol	Description	Polarad Part No.
40	L42	Coil, 2 uhy	AP24076
41	L43	Coil, 2 uhy	AP24076
42	L44	Coil, 1.8 uhy	AP24077
43	L45	Coil, 5 uhy	AP24067
44	L46	Coil, 5 uhy	AP24067
45	L47	Coil, 5 uhy	AP24067
46	L48	Coil, 5 uhy	AP24067
47	L49	Coil, 5 uhy	AP24067
48	L50	Coil, 5 uhy	AP24067
49	L51	Coil, 5 uhy	AP24067
50	L52	Coil, 5 uhy	AP24067
51	L53	Coil, 5 uhy	AP24067
52	L54	Coil, 5 uhy	AP24067
53	L100	Choke, 10 uhy	BK5628
54	L101	Choke, 10 uhy	BK5628
55	L102	Coil, 60 uhy	A26498
56	L103	Coil, 100 uhy	A26499
57	L104	Coil, 100 uhy	A26499
58	CM-1	Crystal modulator	BK5601
59	DL-1	Delay Line, .25 usec	AK5585
60	M1	Motor	BK5565
61	R198	20 K Resistor	AK561R
62	S2	Rotary Switch	C27909
63	T1	Transformer, 160 mc IF	AP24066
64	T2	Transformer, high voltage	BK5604
65	T3	Transformer, power	BP23989
66	T4	Transformer, power	BP23990
67		Bezel	C28514
68		Filter (green)	A28513
69		Cushion	C28515
70		Air Filter	B27553
71		Knob (white dot)	AP22084-1
72		Knob (plain)	AP22084-2
73		Knob for pulse selector	AP22083

POLARAD ELECTRONICS CORP.

CONSULTANTS — DESIGNERS — MANUFACTURERS
43-20 34th Street Long Island City 1, N. Y.
EXeter 2-4500

REQUEST FOR MAINTENANCE

FROM:

COMPANY NAME _____ DATE: _____

ADDRESS: _____ INDIVIDUAL _____

_____ POSITION _____

SECTION OR DIVISION _____ PHONE NO. _____ EXT. _____

EQUIPMENT _____ DATE OF PURCHASE _____

MODEL _____ SERIAL NO. _____ ORDER NO. _____

TROUBLE REPORT:

A. Description of trouble _____

_____

_____

_____

_____

_____

B. Has trouble been localized? _____ If so, how and where: _____

_____

_____

_____

_____

_____

_____

C. Instruments used and measurements taken, if any: _____

_____

_____

_____

D. Is trouble intermittent? _____

E. Hours of operation prior to this trouble _____

F. Date trouble occurred _____

G. Was factory consulted by telephone or letter prior to this request? _____

If so, give date and person to whom directed: _____

_____

H. Additional Comments: _____

_____

_____

_____

_____

_____

_____

When trouble develops requiring factory assistance, complete this form and send to:

Polarad Electronics Corporation
43-20 34th Street
Long Island City 1, New York
ATTENTION: Service Department

After this report has been analyzed by the Service Department, you will be notified when a field service engineer will call on you to make the necessary repairs. If your trouble can best be corrected at the factory, we will so notify you with instructions and authorization for returning the equipment.

NO EQUIPMENT MAY BE RETURNED TO THE FACTORY WITHOUT WRITTEN AUTHORIZATION

POLARAD

PROVEN RELIABILITY

43-20 34th STREET
LONG ISLAND CITY 1, NEW YORK
EXeter 2-4500